

# Editorial

## Chemistry and Light: The International Year of Light



Anders Hagfeldt

Light propagates throughout our lives, cultures and history. It is an essential component in describing Creation, irrespective of our views in science or religion. The understanding of the nature of light encompasses a fascinating history of science. Is it a wave or a particle? For Newton it was a stream of corpuscles and for Huygens a wave vibrating in ether. From the extraordinary scholar Young and his double slit experiment we know that light, as well as matter, can behave both as classically defined waves and particles. The courageous act of Einstein to embrace the curve-fitting constant from Planck's work on black body radiation as a physical entity gave us the concept of photons and the birth of quantum mechanics. Light is also technology. Electromagnetic radiation connects us around earth with the use of mobile phones, Skype and social media. Photonic technologies share a global market of some hundred billion Euros. Works by Rembrandt and Turner as well as modern laser shows are some of the examples we can appreciate in understanding the impact of light in culture. The fascination with and the excitement of seeing a rainbow and the wonder of watching the Northern lights evoke the emotional side of our relationship to light. As for my own favorite I will pick the magic light of a Swedish summer night.

The United Nations proclaimed 2015 as the International Year of Light and Light-based Technologies (IYL 2015), [www.light2015.org](http://www.light2015.org). This is in recognition of the importance of light-based technologies in the promotion of sustainable development providing solutions to global challenges in health, energy, agriculture, education, etc.

Light is intimately connected to chemistry. Defining chemistry as "the science where things can be made that were never made before", we directly relate to synthesis and together with light we have, of course, photosynthesis. For our vision of light there is the intriguing chemistry of the eye. The chlorophyll and cis-retina molecules are shown in the cover image.

In this special issue of CHIMIA we celebrate IYL2015 by presenting several exciting articles covering a broad range of the interactions between light and chemistry. We learn how to purify water from bacteria in the article by **Pulgarin**. Light has transformed medicine and **Allardyce and coworkers** tell the story of the interplay between chemistry and light in this field. How molecular systems can accumulate photoinduced charge is described by **Bonn and Wenger**. A practical application of Einstein's formulation of the photoelectric effect is photoelectron spectroscopy. **Rensmo and Siegbahn** give an overview of the development of such techniques with a special focus on the characterization of solar energy materials. The conversion of sunlight into renewable energy in the form of fuels is presented by **Sivula and colleagues** and in the form of electricity by **Vlachopoulos and coworkers**.

Finally, I would like to thank all the authors for their excellent contributions to this special issue celebrating '2015, the International Year of Light'. Special thanks to Paul Dyson, Claire Allardyce and Gillian Harvey for support and assistance. Let there be light for chemical research in 2015, as well as enlightenment in a complex world!

Prof. Anders Hagfeldt  
Laboratory of Photomolecular Science  
Institute of Chemical Sciences and Engineering  
EPF Lausanne